‘**Whoever could make two ears of corn or two blades of grass to grow upon a spot of ground where only one grew before, would deserve better of mankind... than the whole race of politicians put together.**’

King of Brobdingnag,

Cool wool

Emily Cummins

‘I wanted to take a product that people use every day and make it so that it didn’t use electricity,’ says Emily Cummins, the 19-year-old inventor of a solar-powered fridge based on sheep’s wool. She came up with the idea while studying for her final school exam and, after visiting South Africa and Namibia before going to university, realized it could be used to keep medicines cool in places with no electricity. The fridge, which looks like a designer pedal-bin, uses sunlight to evaporate water through the wool, which is fitted between two aluminium cylinders; the inside temperature is brought down to 7°C. ‘It’s a really simple design that people could make themselves using everyday scrap materials,’ she says. Recycled aluminium requires less energy to produce than other metals, and the fridge itself is also recyclable. Emily – now at Leeds University Business School – has received awards for her innovation. She is working on making the fridge even cooler, and hopes to get it manufactured soon.

Dragon drag

Atkins

They call it the Green Dragon, and it’s the world’s first roller coaster powered by its passengers. Thrill-seekers at the GreenWood Forest Park – an eco-friendly amusement park in Gwynedd, Wales – first get into a funicular carriage, based on those used in Welsh slate quarries 200 years ago, and ride down a short hill. Their weight both pulls the empty roller coaster up the incline and generates enough electricity to get the ride started. Passengers then get out of the carriage, climb back up the hill and board the roller-coaster which sets off on the 250-metre track, reaching a top speed of 40 kilometres an hour, then leaving it at the bottom to be pulled up by the next load of passengers. So efficient is this system that over a year’s operation it is expected to generate more electricity than it consumes.

City sun-around

Cars with sun roofs are two a penny, but Xebra Xeros are something else. These colourful three-wheeled vehicles – which come as a four-seat ‘sedan’ or a two-seater ‘truck’ – have solar panels attached to their roofs. Marketed by an electric car company called ZAP, which stands for Zero Air Pollution, the solar-electric hybrids can travel up to 40 kilometres at up to 65 kilometres per hour – fine for city driving – on only the sun and with no emissions. The batteries recharge whenever the cars are parked in direct sunlight, or can be charged with electricity at a standard wall outlet.

BioFuels

BACK at the birth of the motor car, it looked as if cars would be powered by biofuels. Henry Ford designed his famous Model T to run on fuel made from corn and hemp, and the first diesel engine burned pure peanut oil. Rapidly increasing supplies of cheap crude oil soon replaced them, but now the world is beginning to turn

to them again. Already nearly half of Brazil’s cars

run on biofuel. The United States plans to cut its use of petrol by a fifth over the next decade, stepping up biofuel production to compensate, and the European Union has agreed that bio- fuels should account for a tenth of its countries’ motor fuel by 2020. The attraction is that it offers a substitute for oil, whose production is expected to begin to decline in the next decades – and, above all, it could help combat climate change by reducing the burning of fossil fuels, the main source of carbon dioxide.

The two kinds of biofuel – ethanol (made from sugar- or starch-rich crops like corn or sugar cane) and biodiesel (traditionally made from vegetable oils from palm, soy and rapeseed, and from animal fats) – are theoretically carbon- neutral because the carbon released by burning them is reabsorbed by the plants growing for the next crop. In practice, it is far less simple because huge amounts of fossil fuel are often needed to grow, harvest, make and transport the ‘green’ fuels.

Producing ethanol from corn is particularly fuel-intensive: one authori- tative study suggests that the process from seed to tank may burn a third more energy than is produced. Palm oil is a much richer source of energy, but when rainforest is burned down to grow oil palms or soy – as often happens – many times more carbon dioxide is released than saved.

Besides, destroying the forests dries up water sources, denudes the soil, and drives rare species like the orang-utan towards extinction. Meanwhile, the rush to make ethanol from corn – by 2008 one third of the United States crop will be devoted to it – is already driving up food prices, badly affecting the poor. And even using the entire United States harvest would only produce enough fuel to power a sixth of its cars.

Biofuels can, of course, be produced less damagingly: UNEP wants interna- tional standards to ensure that their benefits outweigh their disadvantages. But hopes are increasingly focusing on the next generation of the technology.

Jatropha nuts, from a tree that will grow on marginal land, offer some promise. But the greatest efforts are going into finding a way of cheaply turning cellulose from the woody parts of plants into an even richer biofuel. The breakthrough, expected in five to 10 years, would enable fuel to be made from harvest wastes like corn stalks – eliminating competition with food supplies – and from trees and grasses, such as willow or switchgrass, which could be planted on wasteland and used to stabilize soils.